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III. A DISCOURSE of the Operation of a Blister when it Cures a Fever, made at a Meeting of the Royal Society, by William Cockburn, M.D. of the Col. of Phys. in Lond. and F.R.S.

IN Pursuance of an Order of this Society, I shall Endeavor to Entertain you with a reasonable Account, *How the Raising of a Blister may Cure a Fever, and its most terrible Symptom the Delirium, and that in Six, Eight, or Ten Hours.*

This I chuse to do towards the Improvement of my own Profession; and to mind some malicious People, that we are not wholly imployed within these Doors, in the Describing the Features and Dresses of Flies; but in discovering too, how they may Benefit, and Hurt Mankind; which is the ultimate end of all our Study.

When I first resolv'd to make this the Subject of my Discourse, I design'd to be more full, and to have extended it to an Enquiry, about the Power these Instruments had to make a Wound, in what Manner, and for what Reasons such a Wound was made, and produced such effects: But the Subject proved endless; and I can assure you by much too long for this place; tho' most Authors have gone it over slightly enough.

It is not necessary to give you a List of these Simples that have been found to make a Blister; since that is as useless to you, as it is Foreign to my purpose. Neither is it profitable, in our present Business, to lay before you the common and visible effects of laying on a Blister: For I may believe, that there is hardly one

n this Kingdom, who has liv'd so long as th e youngest Man now in this Room, that has not had either one himself, or seen it on a Friend. He has seen a Plaister, the great Ingredient whereof are *Cantharides*, laid on a fleshy part, and to have forced up the Scarf Skin with a Liquor , that Oosed and Issued out from within the Sphere of Activity of that Plaister ; and if we consult the most of Physick-Books, the account is no better, but sometimes worse.

Turn over a famous Author, where he writes of our present Subject , and he tells you, that there is a very great Analogy between the Operation and Blistering by Fire, and the known Instruments for making of a Vesicating Plaister, and then adds, *That particulae igneae haud vehementer nimis applicatae cuticulam absque continui Solutione penetrantes cutim ipsam ubi vasorum Sanguiferorum, Nervorum, fibrarumque nervearum extremitates terminantur subeunt ; ibidemque has à positione sua alterantes, varie contorquent, & totius texturae cutaneae conformationem pervertunt : in tantum, ut è vasis omnibus summe irritatis, humor aqueus particulis igneis imbutus, & propterea tum à sanguine, tum à succo nerveo rejectus, in magna copia expuitur : Lympha isthaec, quia cuticulam pertransire nequit, eam à Cute separat, atque in molem vesicularem attollit : è qua demum sponte, aut occasionaliter disrupta effluit.* Then he more particularly adds this concerning the Raising of a Blister with Cantharides, *viz. Ubi primo in Spiritus, & dein horum affectione in humores & partes solidas agunt.* Afterwards, *Quod autem illa primo in Spiritus agunt inde constat, quod in defunctis vim nullam exerunt : etiam in languidis malum omen est, &c.*

This is an Author of the First Form, and I doubt not but that these his words prove sufficiently what I alledged : that little or nothing has been said more particularly

ticularly then any one may observe every day ; supposing only that he thinks that our Eleſth thus covered at any time, with a Blister, is made up of many and divers Veſſels, out of which the Diſcharged Water may come : And not to be Nice with our Author, I muſt obſerve that he falls into as great errors, as can be imagined, when he pretends to ſee more than the moſt common and ordinary Perſon. He ſays that the parts of Fire, and conſequently thoſe of a Blistering Inſtrument, make their way without a *ſolutio continui* ; that they attack the ends of all the Veſſels, or the extremities of all the Veſſels ; and to be more particular he tells us, that they, firſt of all, affect the Spirits. Now I ſay he tells us all this, becauſe he does not endeavour to prove any one but the laſt ; and that, I think, he had better left unproved too. It looks a little oddly that all this ſhould be done, merely by entering the Pores, and yet it is not that he ſeems to hint ; tho' I cannot well imagine how he did apprehend it to be done : But that they ſhould attack the extremities of the Veſſels, and even the Spirits firſt, is a vaſt Contradiſtion to the Circular Motion of the Blood, and to the way of making a Blister : We ſhall find unanſwerable Difficulties, not only in the Circulation of the Blood, but that the Blood ſhould move at all ; if once we are able to prove that Veſſels have ends, or that they terminate in any manner of way but in themſelves.

It cannot ſo much as be brought as an excuſe for this Author, that by the extremities of the Veſſels he may intend the Veſſels of the extremities : this is by no means proper in this place, if his words could bear it. The reaſon, indeed, he brings for the parts of a Blister firſt beginning with the Spirits, is the moſt wonderful thing in the whole matter, even more than Blistering it ſelf ; becauſe, ſays he, they are of no effect

with dead People. *Good God!* Should this Author have pronounced all the most probable things imaginable upon this our Subject; could any one, be perswaded after this, that he had made any discovery at all? Take a Lancer, and Lett Blood of a Dead Man if you can; Is the Consequence that you never could, because now you bring no Blood? Is it to be supposed, that the stagnating Blood should come out at the invisible emissaries that are made by a Blister? Is it to be thought, that there can be any *Inflection*, any *Compression* in the Vessels of a Dead Person? And are not all these the evident and necessary Conditions for making a Blister? How is it then reasonable to think to raise a Blister on any one that is dead: or of what weight can a Consequence be that is founded on such an Experiment.

I have made this necessary Digression, to put mind you how slightly this matter is treated of among us; and to convince you that it is not only hard to speak up to the worth of our Subject, and with that Particularness that both the thing and you do require; but that it demands a longer time than can be well allowed to a Discourse of this kind. You will be still more satisfied of the Truth of this, when I tell you, That I should have thought my self obliged

To prove and determine the Cause of the Motion of these Parts of *Cantharides* that Blister, not only by giving a hint what they are, but with how much force they are brought from the Blistering Plaister and driven into our Skin, Vessels, &c.

I could have satisfied you about the Nature of the Emissaries they make; how, and from whence the separated Liquor is brought between the Skin
and

and Scarf-Skin: That nothing more is necessary, besides the making of these small Wounds, for the discharging of this watery Substance by a common Blister.

That the Vessels are indifferently attacked and broke upon by these wounding parts; and tho' the Veins are more apt to be affected, yet

That no Discharge is made from them; or that they do not contribute to any of that Liquor, we see gathered between the Skin and Scarf-Skin: and *Lastly*,

I should give a reason why this Watery Substance should be denied a Passage in the Scarf-Skin, or in a very small and inconsiderable quantity; notwithstanding that these wounding Particles do pass through *both* the Skins and all the Vessels, and for that reason the Wounds may be supposed to be of equal bigness, and equally capable to transmit the Liquors.

Do but think then that I had insisted on Vescication, in general, or that I had prov'd every one of these particularly, as I can do. What had I done for time, and Patience, to you my Hearers, in a Discourse about a Blister? Any one, but your selves, should be ready to believe, that either there can be nothing of that Consequence in the thing; and that they wou'd rather throw away Medicine altogether, at least Blisters out of Physick, than to be troubled with a Discourse so long, that it is more painful than a Blister it self.

I must beg leave to tell you, at this time, that I have imployed Microscopes to look on the Fly, and its Poulder; to see if I could discover any sharp Instruments, Swords, Daggers, or the like sort of Armiture, in these Warlike and Wounding Creatures. The Fly became a
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very Delightful, but too large a Survey for me ; and the Pouder begot nothing for my Sight, but a dark Cloud ; and whatsoever else I found, I could meet with no Arms ; which makes me think that if they have any, as needs they must, they are concealed, and are to be discovered in another way. Wherefore, I retir'd with my *Cantharides*, and turn'd half a Pound of them into a Retort, that I might try their temper that way. *Wonderful !* there my Enquiry was fully satisfied : There came over with the least Sand-heat and in a very short time, vast quantities of Bodies so very small, that I was not able to discern their shape. This convinced me, that these Particles were very many, and might have an indefinite determination ; since they were so undiscernibly divided, by so weak an Agent, yet with so great force : And therefore, that all the World will grant that they can make a Wound ; and when the force is known, their Power will be found to be of a large extent, which is all that I am concerned with at this time : Insomuch, that I should be perswaded not to name the Process, but that I know that it will please you to discover what I met with in my Tryals on this Animal ; since no body has given any tolerable account of them : All the Authors have suppos'd their parts to be very fixed, very acid, and very corrosive ; Doctor *Grew* alone has found that they are *Alcaline* ; but he will place them among the last and weakest of that Tribe : tho' I hope that the following Account shall be more Instructive.

I retired then with my *Cantharides*, and to the purpose I told you before ; only, it is very remarkable, that though I proceeded in the usual way, on the like Occasions, the whole Operation was performed very soon, and so hastily, that very little *Salt* stuck to the neck of the *Retort*, and the volatil Salt shot in most delightful Crystals in the Receiver. Of the whole Eight
Ounces

Ounces of *Cantharides*, there were only two Ounces and five Drams left as a *Caput mortuum* in the Retort : When the Liquor came to be purified, the smallest heat brought it over suddainly, *Oyl*, *Salt*, and *Spirit* ; so that they could not be parted till, by a repeated Operation, with Brick-dust. I mix'd the Spirit with *Salt* of *Wormwood*, *Spirit* of *Harts-horn*, and *Sal. Armoniack* ; but it did not *Ferment*, contrary to the Expectation of most Authors : Then I turn'd it over upon *Spirit* of *Vitriol*, where it did *Ferment* very *strongly*, and yet *better* with *Spirit* of *Nitre* ; with which also I did mix the Spirits of *Sal Armoniack* and *Hartshorn* ; but they neither fermented so long, nor with so great an *ebullition* ; from whence it is evident, that it is not only *alkaline*, but a great deal more than any one of these I have now mentioned.

Since I began this Enquiry, I met with a Book called, *A Compleat Course of Chimistry*, in which the Author supposes that the Parts of *Cantharides* are very fix'd and very Corrosive ; and to try what that Animal gives, he mixes *Spirit* of *Wine* and *Nitre* : a very strange way to try the Qualities of any simple ; and makes a Conclusion which my mentioned Experiments prove to be very false, and very unnatural. But he had an end to serve, and would put upon the World a very unsafe Medicine.

Yet, since he has brought us on that Subject, and we are now among *Cantharides* ; Creatures that have set all the Physick in this Town in a *Combustion*, or *Ferment* (to use the universal and common word) to leave the thing quite untoucht, would be to acquiesce in a greater indifferency than really there is ; and yet you see that it is not directly to my purpose : and therefore to take just measures and oblige both ; I shall give some hints, and that only to state the Case, which is more than has been

been done in the whole Controversy, and leave them to dispute in close Quarters, and not to Skirmish so much at random as Mankind is apt to do; which proceeds from nothing more than a greater Love to *Dispute* than to *Know*; and I hope that these hints shall be such, as, if us'd as the Topicks in the Controversy, will soon put an end to it, among *thinking* and *sober* People. And first I would observe, that the great Arguments that have been us'd, are a few Instances of a far greater number of Authors that have spoke to this Subject: Next, these Arguments are very often the Flourishes that Authors make in delivering of things, which is a prodigious Fault; for when Truth is not spoke in as few and express Terms as is possible, it gives great occasion to mistake: This is not evident in this case only, but in every thing of the same sort; and we see what the Church, what the Christian Religion has suffered in this way; and Thirdly, that there is no opinion so absurd, that has not a Voucher and a Patron some where, or at some time: And Fourthly, what Consideration Historical Proof bears to that of a *present Fact* or *Reason*.

Well then; this is the next thing that is challenged, *That we may see Cantharides, which have been reputed poison, now Corrected, and are not only innocent, but prodigious Instruments of Health.*

For the clearing of this; first settle *what* a Poison is; and next, since Death, or no Circulation of the Blood, is its Consequence, we must find as many kinds of Poisons as there are ways of stopping the Blood's Motion; which is either, by its own *rarefaction* to a degree, its Coagulation, or lastly, by *letting it out* in such a quantity, that the remaining part gives not Animal Actions; and as *all* or *any* of these may be *sudden*, or do produce their effects in *time*; we shall have *evident Poisoning*; or *Poisoning*

soning for a time ; of which we have many Histories. Again, it may be askt, of which of all those *Cantharides* are ; and of all I believe they may be found entirely, or most especially of the third sort.

Then we shall be led naturally into the next Stage, which is to be satisfied, if they be corrected ; or in plain English, if they have lost their wounding Power, and this is the Fact, of which we may inform our selves, by applying a Plaister of *Cantharides* so corrected, to a place exposed to Air ; and this will settle the Fact of Correction, and in Circumstances much to the advantage of the Correcting side ; because, there the Skin and Vessels are much harder, than those to be met with within the Body ; and if they Blister then ; much more when internally given. The possibility of their being corrected, and of their becoming useful may not be doubted of ; but then it is our reason, in this way, that must be judge. Add to all this the common Observation, that a common Blister sometimes makes Bloody Urine, and compute what quantities enter the Plaister ; and then what quantities of small parts may be sent from them that are thus mixed : Next calculate what probable distribution may be made of these parts to the Kidnies ; and then you'll find that *Parts* that are nearer, and as susceptible must be wounded too, and produce all the ill effects that are supposed and commonly seen. But if all this can happen by so small a quantity of the Pouder that goes to the Plaister, and is confined by the other viscid Ingredients of it : What ? what can be the Consequence of this Pouder when it is taken Inwardly, and in Substance ? But it is Corrected ; and we are told with Camphir. The most unfit correcter so far as I can expect in reason, or even imagine : but still our reason may be frail, and so it may and really is

fo, to a great degree: But then to help it in the way I have already propos'd, I had two Blisters each of them with *Cantharides*; and one of them with as much *Campbir* as *Cantharides*: I say, I had two Plaisters applied after this manner, and for the reasons I just now mentioned. Behold what was the event! what found we next Morning: We, I mean Mr. *Brookes* an Apothecary who made them, and my self; we found that Blister wherein the *Cantharides* were mixt, to have quite as good effects as the other where there was none. What's the Consequence: that is already determin'd, *viz.* That if *Cantharides* said to be Corrected make a Blister when applied to any external part of the Body; that they are to be thought, not to be Corrected: which is the case in hand. But to leave these Particulars to be spoke to at greater length, by those who are Concerned; I proceed to prove the way of a Blisters Working when it Cures a Delirium and a Fever, as I at *First* Propos'd.

The present Enquiry is plainly this astonishing Phenomenon that is so often observed, that the Delirium and the Fever are almost quite defeated by applying a Blister; and in the space of Six, Eight, or Ten Hours.

The most sensible, and the most visible effects of applying a Blister, every one of us that are Physicians or not, observe to be nothing else but the bringing a great quantity of watry Substance between the Skin and Scarf-Skin, and that by applying to the part thus Blistered, a Plaister made with *Cantharides*; or the like Substances, that Experience has taught us that they can Blister: And therefore, since I have shew'd you the many Particulars that any one that is to speak to Blistering, in general, is obliged, by the Rules of plainness

ness to insist upon, and that they should swell this Discourse beyond the Bounds of this place ; I shall only suppose,

1. That there are very mobile, or Volatil Parts in *Cantharides*, &c. that can be determined into our Flesh, with a force sufficient to make their way thorow the sides of any Vessels that are in the lines of their direction, so long and in that proportion that their impress'd motion does continue.
2. That all sorts of fluid Bodies contain'd in the Cavities and Channels of these Vessels may be transmitted, according to the Conditions of Separation of fluid Bodies running in Vessels of that sort, and the wideness of the emissaries made by wounding Particles of *Cantharides*, or any such like blistering Substance.

Next I should proceed to make some Suppositions, from the Nature of a Fever, and a Delirium, that look more particularly to, and may contribute in the discussing the difficulty of our present Subject : But because all my Learned Hearers may not have applied themselves so very much to this kind of Natural Philosophy, and that I may not be too uneasy to them by not being understood : it seems to be very necessary to hint some general things about them, that they may be better able to judge in the Performance.

FEVERS in respect of time, either remain after the same manner from the first sickening, till the sick Person is freed of his Disease, nor not : if the first, they are call'd Continu'd Fevers ; but if the sick Person continues evidently in a sickly way, and yet has great Reliefs, and almost free of his Illness, the Fever is said to In-

termit, or that it is Intermitting. Now that, whatsoever a Fever may be, there can be no Fever but of one of those two sorts is most evident, tho' the *first* we shall have respect to most especially in our present Discourse.

Again, since Physicians not only discover other Diseases, but Fevers too, by the Pulse, and any Body, as well as a Physician, is apt to say my Pulse beats very quick, I am in a Fever. The quickness of the Pulse, in every common understanding, is the Fault of the Pulse; and the Pulse cannot be so but by the Faultiness of the Blood, either in quantity, quality or its Motion: Neither can it offend either in quantity or in quality, but it affects its Motion; and since there are no Symptoms that appear in any time of a Fever, either before it, at the time, or after it, but what necessarily depend on this faulty Motion. This observable defect of its Motion, is the most evident, sensible Rule of a Fever, both to Physicians and every Body else, and is not only a sign of, but is a Fever it self. And therefore give me leave to

Suppose 3dly, That a Fever is an universally heightened Circulation of the Blood, and that a Delirium, *b. e.* that unconnected, incoherent and ridiculous way of imagination and expressing our selves in a Fever, is entirely the effect of this greater Motion, whose discoverer is a quick Pulse, and in the way I have explain'd it, in the 47 Page of the first part of my Book of Sea-sicknesses.

These things being supposed, the question has quite another Face: which might be stated this way: *How wounding by Canibaries makes our Pulse not so quick,* and consequently our Blood, to have a more slow and natural motion; our cited Author will have this great effect, with all its Circumstances to proceed from the pain

pain that is, sometimes, made in the time the Blister is a making. Others, that some of the Particles of the *Cantharides* that mix with the Blood, do induce this quiet, by a peculiar sort of fermentation they make in the Blood.

I think the naming of these Opinions, is enough to show how unsatisfying Accounts we have of them. That pain very often brings a Fever, is his own, and the Opinion of all the World. And I think, if it is to be imagin'd, that so constant a Cause can produce an effect so unlike that which does most commonly attend it; we should have had a better Account of the Accident; and since that is not done, the falsity, and precarious putting on our understanding is too evident to require any further Consideration.

The other is as precarious, and quite as unsatisfying, tho' not so false, if the matter was well accommodated and made the Subject of our Understanding. All the World is full of Fermenting, and every thing is said to Ferment; and yet what Fermentation is, and what necessity there is for it in our Bodies especially, these Fermenting People, that talk so much of it, have not yet so much as told us. That by Fermentation, Bodies change their motion, in its *degree, direction, &c.* is most certain: and really here is a most considerable alteration in the Blood's Motion, as we are inform'd by our Pulse; and therefore it might be supposed that it did Ferment. But then it should have been a most considerable and useful Enquiry, to know how the particulars of *Cantharides* do Ferment, and the ways of affection to make this great Change. I have shown in another place, that there is no such thing as a Chymical Fermentation in our Blood, and that from hints of an eminent Member of this Society, and perhaps the greatest Chymist that ever Liv'd: and now the sequel of my Discourse

Discourse will prove, that this great Change is made without any Fermentation, or any kind of Fermentation, in the most tolerable and sober sense.

I do not name a third Opinion from the quantity of Lympha that is now separated from the Blood, because most of our Modern Physicians do acknowledge, that that is a weak cause for so great an effect ; and it shall appear, by and by, that whatsoever so great a Discharge might perform in the same way we consider other evacuations ; that yet it cannot account for the Cure, in so short a time, no more than they. So here are Considerations taken from the solid Parts, by making Pain of some Benefit ; from the Liquors in the Vessels, by Fermentation, and the Liquors out of the Vessels, by the discharged *Lympha* : and yet not one of them to answer the Phænomenon, even supposing they were spoke to the best advantage. Here seems to be all the exactness imaginable, and even nothing left. Let us state the question again. *A Delirium which is the effect of this quick Pulse, which is Cur'd by the Wounds of Cantharides, or a Blister.*

The Pulse is nothing but the side of an Artery that is distended, by a certain quantity of Blood that is determined thorow its Cavity, by a certain motion at every time the Heart is Contracted, and that touches and beats up our finger when we lay it on a place where we may be sensible of this affection in the Artery. We say this Pulse is more frequent, not so much that it beats oftner than any other Bodies, but that it beats quicker in the same Person when he is said to have a Fever, than before, when he was reputed to be in perfect Health ; so that a Physician is oblig'd to know the natural Pulse of every Person, before he can judge by the Pulse, that any one is Sick. And how that may be done, I have shew'd at length, in a Book some time ago. Howsoever,
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in this our Case, the *Pulse* is *quicker*, and there is no Pulse, but when the Heart is contracted; and the Heart being a Muscle and contracted at every Pulse: The Heart is either the chief or only Cause that determines this Liquor, that distends and stretches the sides of Arteries and makes a Pulse; or a very extraordinary measure of such distentions: But as I said it has the greatest share in propelling the Blood round the whole Body, in respect of the help of the Arteries, which they are supposed to give by their restitution, after their extraordinary Distention. Be it how it will, both their actions are by Contraction; (tho' afterwards I take no notice of that of the Arteries) and no Contraction in Muscles was ever supposed by any sober Man to be perform'd, but by an Influx of Spirits into the Fibres of the Muscles so contracted. So that now our question changes thus, *How wounding by Cantharides makes the Contraction of our Heart weaker.*

The Contraction of Muscles, and Consequently of the Heart, being by the Spirits that flow into them, as I have said before. Therefore whatsoever weakens the Contraction of any Muscle; suppose the Heart, must either be such a thing that can hinder the Separation of these Spirits; or intercept them in their Channel of Conveyance to that Muscle; after they are separated.

The Spirits are known, by Anatomical Experiments, to be separated from the Blood in the Brain: now, whatsoever hinders the separation of the Spirits from the Blood must either hinder that Rarefaction of the Blood, that comes by being broke down into small parts, and makes them Spirits in their proper place, or the Blood of that fineness, that is necessary for it to be perspired, *b. e.* a Body that affects the Blood so, as not to separate Spirits, must be of a Nature to make its Parts more compact

in their Contract ; to have their Contract with a greater *Nisus* , and consequently to have its Parts less separable.

The next way is by affecting its Motion, so that it discharges great quantities out of the Blood ; by these means the quantity of the Blood being lesser, it gives fewer Spirits, when it is broke down ; and is not so capable to be so Comminuted, because of the parts of Blood not pressing so much one upon the other in the whole Course and Time of Circulation.

Or Thirdly, by some means that affect the Parts that transmit these Spirits, so that now no Spirits can be separated, or in a smaller quantity.

If we apply the wounding by *Cantharides*, or its effects, to all these ways, we shall find that in the first Consideration, the Lympha separated in a Blister is nothing at all Concern'd, and that the stupendous effect might possibly be produced, without any such discharge : but if you go further, and suppose the *Cantharides* got into the Mass of the Blood, without any gathering of Waters, you cannot suppose that the parts of *Cantharides* that are so *subtil*, so *alkalin*, and which, by other Experiments, make the *Blood* so *fluid*, can be any great Enemies to the Rarefaction of the Blood, which makes Spirits, and fits them to be separated ; or any considerable instrument in lessening the Rarefaction, which is requisite and absolutely necessary, by the first Condition. Neither are they in their Nature fit Instruments for the third ; besides, that we find no signs and no marks of such an Interruption, either in the Brain or any where else.

The Second Condition for hindering so great a Preparation, and so great a Separation of Spirits, is the effect of all Evacuations : so that, by the by, *Evacuation* is the great Indication for the Cure of a Fever, and is a great
deal

deal more *Evident* than any *supposed Poison*, or *malignity*; *supposed* to be *discharged*, by *supposed Alexipharmicks*, that are their *supposed Antidotes*: yet this effect by an Evacuation is granted, and by the way of working will be found unable to discuss all the Phænomena, in *doing* it in so *short* a time. It is certainly true of the discharge of *Lympha*, by a Blister, what is said of Evacuations of other kinds, and in a proper Proportion what is said of the Evacuation by Perspiration; which is ten times the whole natural Evacuations. It is observable to this purpose what I said, *p.* 108. of the fore-mentioned Book, when I spoke about the vast quantity of Perspiration in a natural and unprovok'd way. *Licet sit maximum, hoc modo, liquorum dispendium: apprimè tamen utilis est secretio hæc ad valitudinem conservandam. Si enim corpus nostrum porosum non esset, ac partes de corpore dicto non dimitteret modo; febricitare nos semper oporteret: quum, enim, calor sanguinis ab ejus motu, calorque per motum productus ab attritione partium calorem comprehendentium pendeat; quæ per motum divulsæ & à contactu abstractæ calori libertatem permittunt, &c.* But this *Contact*, this condition of motion being chang'd, there is a lesser *Nisus*, a lesser Separation and distribution of small parts to the Heart; as we desire. But I say, this is granted to be the effect of Time, of a longer time than in the state of our Proposition; and whosoever is able to look particularly into the Progression; he will be further convinced.

Thus we have seen, by looking into these Conditions as nearly as this place will allow, that the *Cantharides* cannot *condense* the *Blood*, or stop that *Rarefaction*, and that *Contrition* that dispose to the *Separation* of Spirits in their proper place; or, which is the same thing, that they do not prevent a more *frequent Contraction* of the

Heart, or a *quick Pulse* ; as we were obliged to inquire. The Third is evident ; and so should the Second by a little Proof, if it were not granted beforehand, and may be easily understood, by what I did say.

In all this, I have not supposed or assum'd any thing but what is granted as self-evident, among Physicians ; tho' the proving of this in a more rigorous way should be still more satisfying, tho' perhaps less pleasing. However, I hope that the thing has all the possible Proof it is capable of. But since a Blister does not hinder the *preparing and separating of Spirits* ; either in respect of the *Liquor, out of which* they are separated, or the place by which they are separated. And both Spirits are *separated* from the *Blood*, and transmitted thorow the *Glands* of the *Brain*, into the *Nerves*, and by consequence the *Heart* still retains its *frequent and violent Contraction*, notwithstanding of a Blister ; and in despite of all these wounds, we have a quicker Pulse than naturally, or we have a *Fever*.

Let us once more enquire, if a Blister that makes small Wounds, and Cures a Fever, in a short time, can produce this its effect in the only way we have left us ; and that is by wounding that *Channel* that carries those *Spirits*, that *Contract* the *Heart* ; give us a *quick Pulse*, and a *Fever*, with all its Attendants, Delirium, &c.

If this supposition is allowed of, no doubt but that any the *least quantity* of Animal Spirits let out, by such Wounds in a very little time, will proportionably weaken the Heart's *Contraction*, and give us a *slower Pulse* ; which is all we want ; and which is more, this slower Contraction, which is known by our slower Pulse, determining the whole circulating Blood with less force, the *parts of Blood* do not *commingle* themselves so much as
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when the motion was more rapid ; and, by consequence, there is not such a *Disposition* for *separating* small parts in the Brain, that afterwards they may be derived thro' the *Nerves* into the *Heart*. But more-over, the lesser Motion continuing, for some little time, or *two or three Minutes*, in a *Velocity* something like our *natural* Motion : all the *Secretions*, which are performed in such like degrees of *Velocity*, will again begin to be done as before ; and that this must be is evident ; because I have already prov'd, that the different velocities of the Blood's Motion did make the *variety* of *Secretions*, whether the Passages or Pores were uniform, or of irregular and various Figures.

And but just now we saw it, evidently, that evacuations were the genuin ways of Curing Fevers, &c. tho' their way was not answerable to every part of this difficulty.

Here is a notable Discovery ; if we can put little *Emissaries* on the Nerve that is more especially concern'd in the *Heart's* Contraction, we shall hinder any *Preparation* in the Blood for *Separating* so great a number of Spirits ; which is one great requisite : Nay, we shall make *Secretions* of that sort, and in that way, as in time of Health ; and if they be but *Secretions*, the contriting Parts, and those to be broke down, shall have no such a close Contact, and therefore that extraordinary quantity of Spirits shall not be prepar'd in the Blood ; and if they are not prepar'd, they cannot be *separated* from it : or a *moderate quantity* of animal Spirits shall be conveyed into the muscular Fibres of the Heart : or again, which is the same thing, its *contraction* shall be *natural*, or very like, &c.

But more wonderful, all this may be done, or begin to be done in two or three Minutes ; and therefore our Proposition may be, That *wounding by Cantharides* may

cure a *Delirium* not only in Six, Eight, or Ten Hours, but in *One, Two, or Three Minutes*, which is very astonishing.

If I had explain'd Vefication in general, you might have seen, that the wounding Parts might have reached their Stage in a quarter of an Hour ; and that is all I suppose, more than the *Three Minutes*, just now assign'd. But how shall we wound their Conveying Nerves, how shall we apply a Blister, that its Parts may affect, is now the great and only question that remains. To do this, you must bring into your Memory, what you have seen in Dissections : That this *eighth pair* of Nerves, which serves for the Heart's Contraction, has its rise from the *Sides* of the *Medulla Oblongata* behind the *Processus Annularis*, by several Threads which joyn together, and go out by the same hole that the *Sinus Laterales* discharge themselves into the *Jugulars*. And since the Union by the *Atlas*, is not so firm and compact as in the other *Vertebrae* : it is evident, that there is no extraordinary hindrance, why some of these wounding Parts may not come at that Nerve. But if you reflect again, that this Nerve, or considerable Branches of it, run superficially enough on the neck ; and by consequence, gives us less difficulty to apprehend how *some of them* are wounded, and to understand how these miraculous effects do happen, and are produced. Or, it is easy to understand how the *small parts* of *Cantharides* can wound the *eighth pair*, or by wounding its *Branches* derive from the Nerve it self, and lessen the *Motion* of its *Liquor* ; or 'tis not hard to apprehend how wounding by *Cantharides* hinders the disposition of *Separating* Spirits, and intercepts them in their way to the *Heart* ; how they make its *weaker Contraction*, and a *slower Pulse*. Or, again, it is evident, how the *small Emissaries* made in this way
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can *Cure a Fever*, and a *Delirium* in a *shorter* time than is supposed in the Proposition, as Intended to show.

But to prevent our malicious Enemies, that confess we talk like Men of Wit ; but nothing for the use of Man, or Practice ; Oh ! the great Power and Prerogative of a defect of Understanding : Is it not *Reason* that guides that *Experience* they pretend to ? Is it not certain, that there can be no Experience without a suitable use of Reason to *Collect* Circumstances ? or why did a great Man complain of *Experientia* being *Fallax* ? Is not this an unreasonable task to be put to defend good sense ? Good Sense will defend its own cause with People of Sense ; but where are they ? How small a number are they to the gross of Mankind ? Will not a common Almanack-maker persuade the most of the World, that he can fore-tell an Eclipse better than such an one ; who, perhaps Calculated these Tables from whence he has his Prediction ? And what I say of him may be instanced in every thing else. But, I say, to let them see, that tho' this Discourse has more of Humane Frailty than any thing said among you ; I'll let them see, that the necessary Corollaries from this Discourse are very Practicable ; and could let them see, that most of their Positions are most inconsistent, not only with what I have said, but even with what they say themselves.

First, If I had spoke to Vesication in general, I should have shown you, that not only the Operation of a Blister is great and sudden, but of mighty Consequence.

I should have made it evident, how Blisters may *derive*, *rouze* People that are *stupid*, as well as depress too great an *Agility* of Spirits.

I should have shown you how they make *Strangu-ries* ; and how, that tho' they do all this and much more, yet ; by dissipating of vast quantities of Spirits, and by great Discharges of Humidity , they may and really do such Mischief, that can neither be avoided nor repaired by all our *Medicines*, or *Pearled Draughts*.

But to come nearer our purpose ; 'tis most evident, that if the Wounding of this Nerve or a Branch, be so absolutely necessary for Curing a Delirium and a Fever, that whatsoever *Mischief* the applying vast Numbers of Blisters over all the Body may do ; yet the main end is neglected, if you forget a large one *high* on the *Nop* of the Neck. *Secondly*, That if there is no Vescication after the laying on a strong Plaister, it necessarily establishes a new and prodigious Hardness in the Skin and Vessels, a thickning of the Blood for a further total stop ; but nothing of the Blisters chusing to grapple first with the Spirits.

Many Inferences of that sort may be made, but I have already, I'm afraid tried Patience too far.
